



Where will I put m

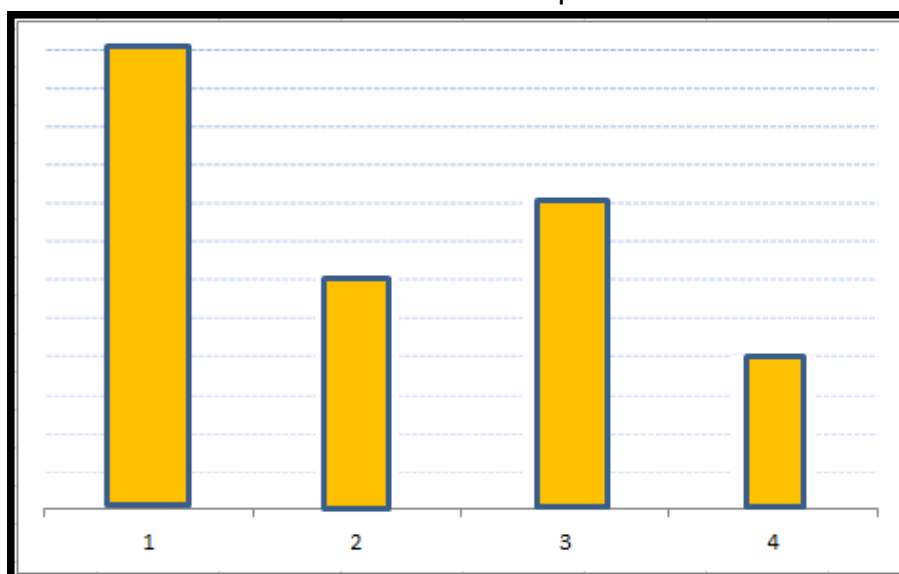


Background

Mae and Mikey have made some gingerbread people of different heights. They have some icing left over and want to use it to give each a belly button. They want to place it accurately onto the body in relation to the overall height of each gingerbread person.

Task One: Your Estimation

1. Imagine each of the rectangles below is a person's height. Help Mae and Mikey by showing with a cross the height of the belly button for each of the four shapes below:



Students should be encouraged to discuss how they can do this accurately e.g. by having a member of their group stand at some

2. Compared to the height how would you describe the belly button height? How do you know?

Belly button height should be a little more than half of the height.

3. Does this change as a person's height changes or does it stay the same? Explain.

Students should be able to explain that while the belly button height increases as height increases, the belly button height will not change in relation to a person's height.

4. If half is 0.5, estimate the decimal that is the closest to the belly button height you have shown compared to the height?

About 0.6

- 5.** And in reverse, how many times greater is a person's height than their belly-button height.

If the belly button height is $0.6 \left(\frac{6}{10} \right)$ of the height then the height will be $1.6 \left(\frac{10}{6} \right)$ times the belly button height.

- 6.** Use the grid lines to find the belly button height of each shape.

SHAPE	Height	Belly Button Height	Decimal ($H \div BB$ Height)
1	6	3.6	1.67
2	3	1.8	1.67
3	4	2.4	1.67
4	2	1.2	1.67

- 7.** In the 4th column under the heading "Decimal ($H \div BB$ Height)" calculate how many times greater the height is than the belly button height for each of the shapes.

- 8.** In the space below calculate the mean of your decimals to find your estimate of the height of the belly button compared to a person's height. Show all your working.

$$\begin{aligned} \text{Mean} &= (1.67 + 1.67 + 1.67 + 1.67) \div 4 \\ &= 1.67\text{cm} \end{aligned}$$

Task Two: The Video

To complete this investigation you are going to use real data to find the height of a person's belly button compared to their height.

- 9.** Watch Video no. 6 from the 'CensusAtSchool Classroom Activities and Support Materials' then 'Professional support materials' pages or follow the link below.

NB we are interested in the second presenter.

<http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/Professional+Development+Videos+Entry+Page>

In this video Ian Wong, the presenter, asks whether the relationship between belly-button height and height conforms to the Golden Ratio.* Ian then uses features of Excel to help him organise the data to investigate whether it is true or not.

He starts by asking: “Can you estimate a person’s height from their belly-button height?” and, “The first step is to establish if a relationship exists between height and belly-button height. If a relationship does exist we can estimate a person’s height if we know their belly-button height.”

For this activity you will complete a similar investigation using data from the CensusAtSchool questionnaire.

Note: the version of Excel used is Excel 2003. The functions in the version of Excel you use may be in different locations but you will still be able to perform the same operations. The locations of the features students are shown below in the HELP section.

**The value of the golden ration is 1.618 (correct to 3 decimal places). An investigation into the Golden ratio can be undertaken as an extension exercise and is shown in lesson CaSMA 12*

Task Three: Real Data Investigation

10. Download your own data sample using the CensusAtSchool random sampler.

You will need to make decisions about the sample size, year level and sex of the students in your sample. You may even want to compare two different samples in your investigation.

11. Copy and paste Height and Belly-Button data into a new Excel worksheet. If you want to compare boys with girls or different year levels you will need to copy sex or year level as well.

13. Using the techniques outlined in Video no. 6 see if you agree that the height is approximately 1.6 times the belly button height.

14. Write a report clearly stating the steps you followed. Include any reasons for decisions you made. Include a conclusion, a copy of your data and any calculations.

15. In your report, list the Excel functions you used to complete this investigation. Put an asterisk next to the ones you used for the first time.

Teachers could use a checklist to ensure that students have included all necessary detail.

E.g. Steps followed:

TEACHER SOLUTION

CaSMa12.1

1. Download data.
2. Copied into new Excel worksheet.
3. Set up a column to calculate height v belly- button ratio.
4. Used a formula to calculate ratio.
6. Used Fill Down for all values.
7. Determined a suitable range by which to identify outliers.
8. Used conditional formatting to highlight numbers outside this range.
9. Found the mean height v belly- button ratio.
10. Numbers displayed to an appropriate number of decimal places.
13. New Excel skills shown with an asterisk.
14. Clear report listing steps followed.
15. Data included

Excel 2010 Help

The version of Excel used in the video is Excel 2003. If you are using Excel 2010, the same features can be found by using the following:

a. To delete a row of data: select data then >Home>Cells>Delete>Delete Sheet Rows

b. To find the mean ratio: calculate height/ belly-button ratio in column C then choose a display cell and type =average (C2: C last cell)
or Home>Editing> Σ > Average

c. Conditional: go to Home>Styles>Conditional Formatting>
Formatting: Highlight Cell Rules>Between